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ABSTRACT

A study explored the effects of direct instruction and modeling on students' ability to follow written directions. Subjects in the experimental group, 62 eighth-grade students enrolled in a suburban New Jersey middle school reasoning and study skills program, were given 22 class sessions of direct instruction and modeling for following written instructions. The control group, 26 seventh-grade students enrolled in a geography course in the same school district, completed the same pre- and posttest (examining their ability to follow written directions) as taken by subjects in the experimental group. Results indicated that instruction in following written directions produced a significant gain for the experimental sample. (Four tables of data are included; 25 references and an appendix of test score data are attached.) (RS)

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FOLLOWING WRITTEN DIRECTIONS

By

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Presented in Partial Fulfillment of the
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ABSTRACT

This research is designed to explore the effects of direct instruction and modeling on students' ability to follow written directions. Middle school students were separated into two groups, the control sample and the experimental sample. The experimental sample was given twenty-two class sessions of direct instruction and modeling. Results suggest that instruction did have an impact on the performance of subjects in the experimental sample. Several theories are considered for their implications regarding this issue.

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Most American students have been taught to read by using a basal reader. As an element of this approach, written directions are usually introduced to first grade level students in both workbooks and worksheets. Vocabulary found within these directions are not necessarily introduced in the series' controlled vocabulary. Therefore, the vocabulary within the written directions usually needs to be addressed by the classroom teacher. Through multiple exposures and sufficient practice, the vocabulary terms which comprise these written instructions should be read independently by the student (Wilson 1979). However, young children frequently do not follow directions. Instead, they follow their natural behavior of exploration and search (Case 1975). Sometime between ages 8-11, a change occurs. In memory tasks, many children begin to use rehearsal and mnemonic strategies to aid in recalling directions (Flavell 1970). They are also beginning to focus on salient cues, while ignoring those that are irrelevant (Hagen & Hale 1973). The use of such strategic behavior and logical thought is enhanced through practice and training (Vliestra 1982). But, recent research indicates that most students able to comprehend various sets of directions probably learned to do so not through instruction, but experience (Hayes and Henk 1986). When a group of 102 high school readers were interviewed, not one could recall being given any formal training in following written directions. This correlates with research compiled by Fox and Siedow in 1980, whereby they state that good readers follow directions well 80% of the time and poor readers are usually fortunate to achieve a success rate of 50%. Thus, "students' inability to follow directions is probably one of the most pervasive problems in classroom instruction" (Kassack 1987).

Instruction in following directions can often contribute to performance inadequacies. Teachers tend to provide oral explanations when complex directions occur in school materials. Teachers have also rewritten sets of directions so that students can meet with success (Henk & Helfeldt 1987). Oral explanations, provided by the instructor to accompany written directions, become a crutch for the students to rely upon with the responsibility to read, interpret, and identify procedures for following written directions being redirected to the instructor. The student then receives little or no practice in the skill, which impedes his/her ability to acquire independence (Schoenfeldt 1986). With regard to teacher-written directions, each set of directions must be clear and appropriate for student reading abilities. The directions should contain: short and simple sentences, simple vocabulary, sequenced steps and examples or illustrations if possible. But do they? This technique of rewriting directions is not flawless. Often, terms are incorporated which do not clearly specify the nature of the student response. Some directions are confusing because of the number of questions asked for one direction. They are often unnecessarily complex and ask for more than one kind of response. Teacher written instructions, therefore, are not necessarily reducing the complexity of the task - but increasing it. As opposed to accompanying written directions with oral explanations or rewriting directions, the most efficient means of improving student understanding of directions would be to design instructions to help readers acquire this process (Fox and Siedow 1980).

Students need to be aware of the fact that there are four major categories of directions: "how to directions" - playing a game or flying a kite, "part to whole directions" - following a recipe or doing an art

project, "directions for experiments" - answering a problem or applying a principle, and "drilling and testing directions" - completing a classwork assignment or taking a test. Knowing the types of directions should be accompanied by an introduction to a sequential method of following directions. Students should first be taught how to skim directions to obtain a general idea of expectations for task completion. They should also be taught signal words that indicate the order of completion. This should be followed by a thorough reading with concentration emphasis on a detailed understanding of the specific task, desired outcome and process sequence. Once the task has been completed, students should review the directions to be certain they have followed them correctly (Mueller 1984). These approaches and concepts should be reinforced each time a new task is introduced. Instructors need to teach students how to read and follow directions. This may require direct instruction with some of the directions' terms, and modeling how to do the assignment. Instructors must be certain that students can decode the direction words that are used, comprehend their meaning, and understand the procedures. Students also need to know that directions differ from most other forms of prose because the order in which they are recalled is often of critical importance in completing the task. Paraphrasing or employing mnemonics are techniques, which when used, limit time spent on tasks while simultaneously enhancing recall in correct order. Neither technique is difficult to implement and both have obvious an proven benefits (Glover, Harvey, and Corkill 1988).

Although a significant body of information exists, there has been little or no evidence on approaches that could be taken to improve students' following directions behaviors. Research to determine whether

guided practice in following written directions can produce a significant change in students' behaviors appears desirable.

HYPOTHESIS

There is no significant difference between the performance of a sample of eighth grade students receiving direct instruction and guided practice in following written directions and that of a sample of seventh grade students not exposed to instruction and guided practice when comparing results on a test of following written directions.

PROCEDURES

The subjects which comprised the control sample were 26 seventh grade students, who at the start of the program ranged in age from 11-11 to 12-11 years, currently enrolled in a middle school Geography course in a suburban school district in Woodbridge, New Jersey. Participants in the control sample had been administered the California Achievement Test (Level 16E) in March of 1990. The range of scores in the total Reading section, national percentile, was 59-71, with a mean of 73.

The experimental sample consisted of 62 eighth grade students, who at the start of the program ranged in age from 12-11 to 14-3 years, currently enrolled in a middle school Reasoning and Study Skills program, in the same school district. Participants in the experimental sample had also been given the California Achievement Test (Level 17E) in March of 1990. The range of scores in the total Reading section, national percentile, was 28-97, with a mean of 58.

A test on following written directions was developed, using concepts and materials from the Woodbridge school district's Language Arts/Study

Skills curriculum guide and The Cherry Hill Study Skills Program. This test, administered both as a pre-test and post-test, consists of 76 written directional commands. The skills contained within this test are: Following written directions and tracing this route on provided maps, making a diagram on a grid, matching a series of illustrations with written statements, following sequential directions, and the ability to interpret a model car instruction sheet accompanied by an illustration.

Direct instruction materials were taken from, Mastering Reading Through Reasoning, written by Dr. Arthur Whimbey and The Cherry Hill Study Skills Program, prepared by R.E. LaVoie and Nadine Cohen.

On October 18, 1991, the control sample was administered the following written directions test as a pre-test. Subjects were told that they were going to take a test to determine how well they followed written directions, and that they would be given the entire class period of 40 minutes to complete the items.

On October 23, 1991, the experimental sample was given the identical test and the same amount of time for completion. This pre-test was followed by a series of 22 class sessions of direct instruction in following directions. The classroom instruction addressed the following objectives:

. Demonstrate preliminary notetaking ability

* Listen and take notes on signal words

. Write down key words and ideas in an outline form

. Look at and try to imitate modeling of notetaking

. Make a diagram of a place as described in a passage

. Make a diagram using spatial descriptions

. Understand the use of comparatives in existing order

* Translate written descriptions of order into list form

. Review sequence and chronological order

. Identify commonplace sounds on tape to distinguish hearing from active listening

* Complete a worksheet of objective questions which tests students' understanding of active listening

* Practice 3 step method of finding main idea

. Take "World's Most Unfair Test"

. Discuss objective and subjective type tests and how to prepare for them

. Give sample directions from History, Math and Science tests and have students determine possible problems that could be encountered by failure to follow these directions

. Identify effective methods for taking tests by relating personal test taking experiences and by examining techniques suggested by instructor

. Demonstrate ability to follow written directions by constructing a complicated paper figure (origami) in the proper shape

. Complete a quiz on following written directions with 80% or greater accuracy

. Categorize true/false questions into a set of principles by referring to the true/false section of the "World's Most Unfair Test" and identify each type of question as it occurs

. Complete practice sheet of true/false questions with 80% or greater accuracy

. Demonstrate competence in analyzing true/false questions by completing a ten question quiz with at least 80% accuracy

Each objective was introduced during one class session of 40 minutes, those with asterisks spanned two to three class sessions. Reinforcement/enrichment activities were assigned as classwork and/or homework to monitor mastery on an individual basis.

On completion of instructional activities, post tests were administered and statistical analysis made.

RESULTS

At the onset of the experiment, to determine whether subjects in both the experimental and control situations were similar in ability when following written directions, the means and standard deviations of pre-test scores on a test of following directions were tabulated. These results can be seen in Table 1.

Table 1 Means, standard deviations, and t of pre-test scores for the experimental and control samples

Group	M	SD	t
Control	64.65	20.27	n.s.
Experimental	64.48	21.60	
DF 89			

The difference between the means of .17 is negligible and was non-significant when tested by t.

With respect to the predictions generated from the theories as described in the research section, the data in Table 1 are not consistent with those put forward by Woodworth and Wells (1911) and Pinter and Toops

(1918). Results of those studies indicate that the scores on a test of written directions will increase with the age of the subject. However, these results were based upon specially constructed directions as opposed to directions naturally occurring in the classroom environment.

Binet (1912) and Thorndike (1927) had similar findings in their studies. Both researchers found that the ability to execute a series of "commissions" increased with age. This is contrary to the results of the current research. Had an increase with age been the case, the pre-test scores of the experimental sample (ages 12-11 to 14-3) should have exceeded those of the control sample (ages 11-11 to 12-11), yet there was no significant difference between the two.

A possible alternative interpretation of the pre-test results of this study is consistent with research compiled by Fox and Siedow (1980), which states that good readers follow directions well 80% of the time and poor readers are usually fortunate to achieve a success rate of 50%. After reviewing The California Achievement Test scores of the experimental and control samples, subjects comprising the control group had a mean of 73 in the national percentile of the total reading battery. While on the same section of this test, experimental subjects had a mean of 58. The differences in reading abilities, at the onset of this study, suggest that the experimental sample had a lesser potential to succeed.

Table 2 shows the gain/fall in scores from pre-test to post-test of both the experimental and control samples. Although there was a mean difference in favor of the experimental sample of almost 4 points, that difference was not significant at either the .05 or .01 level

Table 2 Means, standard deviations, and t test score of the gain/fall in scores from the pre-test to post-test of the experimental and control samples

Type of test	M	SD	t
Experimental Pre-test to Post-test	10.10	18.39	0.99
Control Pre-test to Post-test	6.15	12.73	

DF 8

Table 3 shows the performance of the control sample on both the pre and post tests in following written directions. This sample received no direct instruction or modeling in the area of following written directions. They were given the pre-test on October 18, 1991, and were readministered the same test as a post-test on January 16, 1992. Eight

Table 3 Means, standard deviations, and t test score of pre and post test scores of the control sample

Type of test	M	SD	t
Pre	64.65	20.27	1.28
Post	71.58	18.60	

DF 50

of the 26 subjects did not complete all 76 items on the pre-test, and test results were scaled appropriately. All 26 subjects completed each of the 76 items on the post-test, and 77% of the sample did show improvement. However, the mean gain of 7 points from pre-test to post-test was not significant as shown by the t of 1.28

Table 4 contains data from the pre and post-test results of the

Table 4 Means, standard deviations, and t test score of pre and post test scores of the experimental sample

Type of test	M	SD	t
PRE	64.40	21.60	3.03
POST	75.29	18.48	
DF 123			

experimental sample. It was here that a significant difference (t test of 3.03, $s < .01$), was noted. This eleven point gain in mean data suggests that modeling and direct instruction did have an impact on the subjects participating in the experimental sample. As with the theories proposed by Case (1975), who suggests that subjects at certain ages may still benefit from direct explanations in translating task information into higher order strategies, each of the experimental subjects received 22 class sessions of direct instruction, modeling, and practice in following written directions. Although this quantity of time would not necessarily be considered "extensive" by LaBerge (1973), it certainly is a consideration as these sessions resulted in an improvement in the performance of subjects in the experimental sample with regard to following written directions.

CONCLUSIONS and IMPLICATIONS

This study attempted to determine whether direct instruction and modeling procedures would improve young adults' ability to follow directions in a written format. The discussion which follows will focus on: reading abilities, quantity of practice time, growth and maturation, and test limitations.

The hypothesis of this study; that no significant difference on a test of written directions would exist between samples, was supported by the results of this study and thus the hypothesis was accepted. However, instructions in following directions produced a significant gain for the experimental sample suggesting that instruction can make a difference in the ability to follow directions.

The participants in this study, a seventh grade Geography class and an eighth grade Reasoning and Study Skills group were chosen on an instructor volunteer basis. As a result, reading ability levels varied between the two samples. Although these ability levels were not tested for significance of the difference between the means, these levels might have had an impact on comprehension during direct instruction and modeling-elements that were not isolated and measured in this experiment. In studies conducted by: LaBerge (1973), Binet (1912), Thorndike (1927), Fox and Siedow (1980) and Zacks, Hasher, Alba and Rose (1989), each researcher concluded that groups with higher academic ability outperformed those with lower ability. In essence, "good readers" are more successful in following written directions than "poor readers". Therefore, control and experimental samples with approximate equal reading abilities at the same grade level, would have been most desirable

to determine what kind of growth was made with no instructions as was done using the seventh grade as a control sample.

The quantity of practice time needed to perform a task successfully is dependent upon both the individual and the task. The manner in which students encode information influences their ability to remember and carry out written directions. The use of paraphrasing and mnemonics, encoding manipulations, can reduce the amount of practice time as was determined by Glover, Harvey, and Corkill (1988), but again this element will fluctuate from individual to individual and cannot be used universally in all tasks. Subjects within the experimental sample in this study were given 22 forty minute class sessions consisting of: direct instruction, modeling, and practice. For some individuals this quantity of time was sufficient since considerable gains were made. However, this did not hold true for each individual in this group. Perhaps additional sessions would have resulted in their attaining higher scores, for as LaBerge (1973) has stated, the amount of practice needed for successful performance appears to be extensive.

As individuals mature, they begin to focus on salient cues while ignoring those which are irrelevant Hagen & Hale (1973). Strategies are usually employed to aid in recalling directions, as opposed to following a natural behavior of exploration and search (Case 1975). It is believed that this maturation occurs somewhere between the ages of 8 and 11 Flavell (1970). Each subject within the experimental and control samples had already surpassed this pre-established chronological age, and should have acquired the ability to direct their focus to pertinent information contained within the written directions. Yet, only a minimal amount of students, as measured on both the pre-test and post-test were able to

demonstrate mastery of this skill. Changes may be occurring between ages 8 and 11, and focus may become more directed, but it would appear that reading ability had a greater effect on the results of this experiment than did chronological age, since age change between pre-tests and post-tests was negligible for either sample.

Finally, it should be noted that these findings are of limited generalizability for a variety of reasons. First, the pre-test and post-test were one and the same. Thus, those students scoring perfectly on the pre-test would have been unchallenged by the post-test and growth in the area of the following written directions was not measurable due to an insufficient top to the test. Also, the test was designed by the experimenter, as to-date, there is not an available test to use as a measure of these skills and thus reliability can be questioned. Replications of these results with other populations is desirable.

FOLLOWING WRITTEN DIRECTIONS: RELATED RESEARCH

The ability to follow written directions has long been recognized as a crucial skill for success in school. A direction is defined as a statement that commands behavior which is followed correctly when the behavior matches the command.

Early investigators such as Binet (1912) and E.L. Thorndike (1927) found that directions could be used as measures of intelligence and that the ability to execute a series of "commissions" increased with age. Similarly, Woodworth and Wells (1911) and Pinter and Toops (1918) found that scores on their directions test increased with age, but these investigators did not attempt to determine how the variables they identified affected the complexity of a set of directions. These and subsequent investigators used specially constructed directions as opposed to directions naturally occurring in the classroom environment.

Boehm (1967) studied materials representative of K-3 curricula and found that many comparative concepts such as "below", "middle", "different", and "top" are used repeatedly in basal written directions. These written directions are usually introduced at some point in the first grade level workbook and worksheet activities. However, there are wide individual differences in children's rate of acquisition of these "basic concepts". Therefore, level of concept mastery must be considered carefully in choosing the vocabulary used in written directions.

In view of the general use of controlled vocabulary in basal readers, one tends to assume that the vocabulary appearing in the written directional statements in the series' workbooks and worksheets is the same controlled vocabulary as in the readers. However, if the vocabulary appearing in the written directional statements does include words

outside the controlled vocabulary of the basal reader which are not familiar to the child, the child's attainment of the objectives of the reinforcement activity could be inhibited and possibly contribute to an early sense of failure.

A comparison was made to determine whether vocabulary in the written directional statements of the first grade level workbooks and worksheets of two basal series was included in the controlled vocabulary of the texts. The 1969 and 1976 Ginn and the 1971 and 1976 Houghton Mifflin grade one basal reading materials were examined by LaVisa Cam Wilson. Results showed that both series included more extra words in the written directional statements of their worksheets and workbooks. Since workbook pages and worksheets are often assigned for independent work, new words in the written directional statements may inhibit the pupil's achievement of the lesson's objective.

Until the pupil has the right vocabulary and skills necessary to read the directions, he/she should not be expected to complete the assignment independently. Teachers need to be aware that written directional statements may include some words which are different from the series' controlled vocabulary. These extra words may need to be taught systematically and with sufficient reinforcement to ensure that they become part of the pupil's sight vocabulary which can be combined with the pupil's skill in decoding so he/she can read the words independently. Identification of new words presented in the written directions will enable the teacher to include these words in the teaching sequence before the pupil is required to use them. This may eliminate many errors by the pupil which could contribute to an early sense of failure in reading.

To ascertain whether direction following difficulties were prevalent throughout the elementary grade levels K-5, a study was conducted by Kaplan and White in 1980. A sample of 1,417 teachers' classroom directions was obtained from 18 classes in grades K-5 and each direction was task analyzed for: a) the number of behaviors required to execute it; and b) the number of qualifying statements setting conditions on the response. The results indicated that directions given by teachers are very similar in complexity over grades K-5, as measured by the number of behaviors and qualifiers. Seventy percent of the directions contained no more than one behavior and one qualifier. Ninety percent of the students could execute correctly these single behavior and single qualifier directions, indicating that teachers tend to give directions that their students can execute correctly. However, correct execution decreased as the number of behaviors and qualifiers increased. Although performance improved steadily over grades K-3, it leveled off in grades 4-5. It may be possible that teachers are aware that their pupils do not follow complex directions as well as simpler ones, therefore tend to refrain from the more complex directions. Who then, becomes responsible for instructing students in the area of complex directions? And when should this direct instruction begin?

In an attempt to find the answers to the above questions, observation and labeling behavior were investigated in 5, 8, 11 year olds, and adults. Subjects were asked to find one or all differences in stimuli. For half of the subjects at each age, the same stimuli appeared on each problem; only the location of the differences varied. For the other half, new stimuli appeared on each problem. In both stimulus conditions, the 11 year olds and adults observed according to the different task

instructions, but the 5 and 8 year olds examined all stimuli. The 5 and 8 year olds also frequently labeled the stimuli, while the 11 year olds and adults did not. This research indicated that the percentage of subjects following instructions increased with age. Young children frequently do not follow instructions. Instead, they may attend to perceptually salient cues and follow their natural behavior. While older children not only have a greater capacity for logical thought, but also have accumulated perfected strategies in many specific tasks. With sufficient practice in the use of strategic behavior, they may form a more general goal directed orientation for problem solving (Vliestra 1982). That children may not follow directions spontaneously but can do so with training is consistent with Flavell's (1970) concept of a production deficiency. Thus, underlying children's production deficiencies may be a preference to explore. In this research, exploration was seen only in children, but the task was more designed for children than for adults. Instructions appear to be more salient when associated with reinforcement, and once the children directed their attention to the directions, they followed them well. This research is consistent with the hypothesis of Case (1975), who stated that subjects at certain ages may still need direct explanation in translating the task information into higher order strategies.

The question then becomes, "Is temporal order encoded automatically?" Encoding operations vary in their attentional requirements. Operations that drain minimal energy from our limited-capacity attentional mechanism are called automatic; their occurrence does not interfere with other ongoing cognitive activity. Automatic operations function at a constant level under all circumstances. They occur without intention and do not benefit from practice. These processes encode the fundamental aspects of

the flow of information, namely; spatial, temporal, and frequency-of-occurrence information. These processes show limited developmental trends. There are other automatic processes which develop through practice and function to prevent the subcomponents of complex skills from overloading our limited-capacity system. Contrasted with these processes are effortful operations such as rehearsal and elaborate mnemonic (Hasher and Zacks 1979).

Since some temporal order operations are encoded automatically, but others benefit by practice, Zacks, Hasher, Alba, and Rose (1989) conducted research to answer two questions: (1) Would the amount and appropriateness of practice affect acquistion of temporal information not encoded automatically, and (2) Would reliable individual differences be found on a test of memory for temporal order? Their findings were: Retention of temporal order increased with practice at three (or four) successive lists of words, and that reliable individual differences were indicated by the findings that subjects' relative performance levels remained stable across the lists, while groups with higher average academic ability outperformed those with lower ability. The question regarding how much practice will result in the development of automatic processes was not yet clear, however, the amount of practice does appear to be extensive (LaBerge 1973).

Many studies have been conducted to attempt to measure the amount of practice needed to perform tasks successfully. Glover, Harvey, and Corkill (1988) performed three experiments in an attempt to determine if students' memory for written directions could be facilitated. The first experiment contrasted a control condition with a condition in which students expected a free recall post test and a condition in which

students expected to have to recall directions in the correct order. Results indicated that experimental procedures resulted in significantly greater levels of overall recall than the control procedures. Experiment two contrasted the learning of directions in a mnemonic condition, a paraphrase condition and a control condition in which subjects expected a test of their ability to recall information in correct order. The results indicated that in both the paraphrase and mnemonic conditions students had significantly more total recall than the control condition, with the students in the mnemonic condition outperforming both the paraphrase and control groups. Experiment three required students to actually perform a task from memory. Overall, the results suggest that students' memory for directions can be enhanced through various encoding manipulations, but, practice time varied with each individual. Therefore, although time is certainly a consideration, the way in which students encode information influence their ability to remember and carry out written directions.

To furthur explore the use of mnemonics, McCormick and Levin (1984) attempted a comparison of different prose-learning variations of the mnemonic keyword method. Seventh and eighth grade students were presented with fictitious biographies to remember. Keyword students were instructed to use a prose-learning adaptation of the mnemonic keyword method, and control students were left to their own devices. Keyword groups could be distinguished from the controls on the basis of qualitative differences in their recall patterns. Even when associative interference is maximized, only a limited disruption of updating resulted, as was determined by Bellezza (1982). In a series of 5 experiments incorporating mnemonics, support was found for the hypothesis that memory can be searched using temporal cues and for the idea that the size of the search

set formed in memory is important. It was found that the older the event was to be recalled, the greater were the number of events in the search set. Therefore, the size of the search set created in memory and the role of temporal-contextual cues in defining this search set may be important factors not only in mnemonic recall but other types of learning and recall as well (Toglia and Kimble 1976).

Realizing that the ability to follow written directions can be altered with age, encoding manipulations, time, and practice, instructors should provide students with direct instruction in critical reading skills. Patching, Kameenui, Carnine, Gersten, and Colvin (1983) compared a control and two experimental treatments, a direct instruction approach and a workbook with corrective feedback approach in training three critical reading skills. The skills were the ability to detect instances of (a) faulty generalization, (b) false causality, and (c) invalid testimonial. Thirty-nine fifth-grade students were randomly assigned to one of three groups. When the 3-day instructional intervention was completed, students were given three specially designed tests. The critical reading test indicated that systematic instruction by an adult using modeling and explicit training in overt strategies was significantly more effective than either exposure to the same material in a workbook format with no intervention. This study is not an isolated experiment. Several studies suggest that children can improve their critical reading skills, learn to make inferences, to generalize, and to make logical assumptions at an early age if they receive systematic instruction in these skills.

In an early study by Nardelli (1956), 10 hours of instruction over a 6-week period produced significant effects in the ability of sixth-grade

students to draw inferences and recognize propaganda devices. Although the scope and precision of studies vary, the findings support the hypothesis that critical reading and thinking skills can be improved through explicit training and guided practice in self-management or control practices. It appears that even intermediate grade students may develop a more positive attitude toward learning when teacher/student rather student/workbook interaction is stressed.

Communication between the teacher and student is effective when students use the process of reading to interpret written directions so that content in subject areas can be learned or demonstrated. Tests, homework assignments, and in-class tasks require the ability to read and comprehend directions written by content area teachers. When teachers write directions, the general assumption is that students clearly understand what the teacher has written. When this assumption is met, student performance on a test or assignment reflects content mastery. This performance allows teachers to plan furthur instruction to meet individual and group needs. However, when teacher-written directions are not understood, the process of reading directions may confound acquisition and demonstration of content information. In this case, student performance does not provide a reliable guide for planning on-going instruction. If communication between teachers and students is to be effective, teachers must write directions which can be understood by all students. Because the potential range of reading ability is great and because directions provide a significant means of written communication in content classrooms, it is important to establish the effect reading ability has on students' understanding of the directions written by content area teachers. To investigate this problem, written

directions for the completion of assignments and examinations were secured from teachers in the four content areas of English, Social Studies, Mathematics and Science. Ten examples of teacher written directions were selected for each content area. For each direction, one five-multiple choice question was written to determine whether the student understood the response expected by the teacher, e.g.,drawing a picture, writing a paragraph, solving an equation, etc. One hundred and sixty-eight students in tenth and eleventh grade responded to the 40 items. The data collected was interpreted to mean that the effectiveness of teacher written directions as a means of communication was dependent on student reading proficiency rather than on the vocabulary and symbols of a particular content area. This evidence suggests that given the same set of directions, the same information will not be conveyed to each learner. If some students show difficulty understanding teacher-written directions, then reading ability needs to be improved and/or the directions need to be modified (Fox and Siedow 1980). Before modifying or writing directions for independent activities, a teacher must decide how these activities are to be used. If the purpose of the activity is to guide the child to the discovery of something new, the written directions for the independent activity should be as simple as possible. Directions can be somewhat more challenging when the activity is for the purpose of reinforcing concepts or skills previously taught. Difficult vocabulary is one of the most obvious influences on readability of directions. Two types of vocabulary need to be considered: direction related vocabulary and concept related vocabulary. Since the goal of truly independent activities should be total mastery by the student, too great a vocabulary load will make mastery impossible. Order of directions also needs careful consideration. Directions are much easier to follow if they are listed or

numbered. Careful arrangement of print on the page can make directions far more readable. Color or underlining will emphasize a word or idea, but since these are used to focus attention, they should be used selectively. Finally, pictures or illustrations can often make directions easier for two reasons: redundancy-directions are presented in words and pictures and because a picture of the final product can serve as an advance organizer or as a means of self-evaluation upon completion of the task Pikulski and Jones (1977). Stone and Glock (1981) conducted an experiment to explore the manner in which people read and use procedural information presented to them in text and illustrations. University undergraduates read directions for the assembly of a model of a loading cart, assembling the model as they read. The use of illustrations with text was found to produce significantly more accurate performance of the task. Results also suggest that specific types of information are presented more effectively in texts or in illustrations. The presence of redundant information in another form provides the reader with an opportunity to seek clarification from that alternate source. Also, individuals differ in their ability to extract and use information presented verbally or pictorially and the addition of an alternate form of the directions allows these individuals the flexibility of selecting the optimal form for their needs. Color or underlining may also be effectively used as cues to enhance children's learning pattern similarities. Two experimental tasks, which used color, underlining, and word shape cues in CVC words to determine the influences of those cues in aiding subjects to detect structure in words, were given to 636 K-3 pupils. Task 1 was a visual task designed to compare the responses of children who already developed reading skills with the responses of children without basic reading skills. Color cues and underlining cues were substantially equal

in their effectiveness, however, word shape was not an effective cue. Task 2, was a visual and oral task using only kindergarten subjects. Color cues and underlining cues aided structure detection. Again, the color and underline groups made significantly more correct responses than the control group which lacked either of these visual cues. Since following written directions is a visual task, measurable by completeness of correctness of the end product, perhaps use of color or underlining will draw attention to those directions often overlooked causing the subject to respond to the difference in the visual pattern (Knafle 1973).

Aside from the application of underlining and color and the addition of illustrations to aid subjects in following written directions, direct instruction has been proven to be effective. Many readers have never received any direct instruction in how to read instructions. Direction-following skills can be nurtured through a systematic series of explicit instructional activities. Direct instruction consists of 4 steps: awareness, modeling, guided practice, and independent practice. The introductory step makes students aware of what skills they are learning, why, when, and how to use them. In the modeling phase, the teacher simultaneously shows and explains how to complete a task or use a skill. Think aloud strategies that reveal what and how the teacher is reasoning are the focus. In the guided practice step, opportunities to practice the skill or process are provided. During this step, the teacher may provide prompts in think aloud activities, direct attention to highlighted cues, or give feedback. The final step entails independent practice and transfer of the new skill to a natural reading setting (Henk and Helfeldt 1987).

In summary, the ability to follow written directions is a skill which students are exposed to during the early elementary grades. Many comparative concepts are used repeatedly in these directions, but prior to student execution of these commands, the student must possess the reading skills and thinking skills necessary to comply with what is requested.

In grades K-5, many written directions contain no more than one behavior and one qualifier, and although a great number of students are able to execute correctly these single behavior and single qualifier directions, problems are detected when subjects are given more complex directions. These problems which result in an inability to follow written directions can be multi-causal in nature. Age, encoding manipulations, time spent on task, skill practice, reading ability and communication between the teacher and student are all factors which must be taken into consideration in order to measure actual ability or performance.

To accommodate individual differences within the classroom, instructors have a tendency to rewrite directions altering complex directions so that they become simple directions. By doing this, students lack exposure to complex directions thus encountering difficulties when expected to comply with more than one command on an independent level.

If directions need to be modified, they must first be analyzed by the instructor to determine: the purpose of the activity, level of vocabulary versus the reading abilities of the students, and the order or sequence by which said directions should be executed. Color, underlining and illustrations can aid in emphasizing concepts if used selectively while paraphrasing and mnemonics can serve as cues to aid in recall. However,

more effective than this is direct instruction. Direct instruction consists of teaching students directions types: 1) "how to", 2) "part to whole", 3)"directions for experiments" and 4) "testing directions"(Mueller 1984). Modeling, providing guided practice, and providing independent practice is a systematic format for presentation of lessons. What instructors need to recognize is that it is their responsibility to teach students how to follow directions and then- "Let them do it", as without the practice, students will not be able to function independently- our ultimate goal of reading (Schoenfeldt 1986).

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APPENDIX

FOLLOWING WRITTEN DIRECTIONS

CONTROL SAMPLE

STUDENT SCORE	CAT SCORE	PRE-TEST SCORE	POST TEST
1	18	51	62
2	59	37	51
3	98	86	100
4	99	84	89
5	93	98	98
6	71	68	73
7	34	59	79
8	94	59	67
9	59	94	66
10	36	43	50
11	66	56	63
12	93	65	67
13	77	67	68
14	27	28	45
15	97	90	100
16	90	100	100
17	84	59	62
18	81	45	68
19	36	45	54
20	76	84	98
21	96	92	86
22	54	56	58

STUDENT SCORE	CAT SCORE	PRE-TEST SCORE	POST TEST
23	81	57	94
24	74	77	56
25	62	50	58
26	17	41	39

FOLLOWING WRITTEN DIRECTIONS

EXPERIMENTAL SAMPLE

STUDENT SCORE	CAT SCORE	PRE-TEST SCORE	POST-TEST
1	45	37	64
2	52	51	43
3	89	98	100
4	59	91	64
5	34	37	59
6	94	98	100
7	58	60	59
8	81	93	98
9	53	66	97
10	66	54	100
11	66	68	73
12	66	50	58
13	NOT AVAILABLE	48	65
14	38	28	48
15	74	94	68
16	40	63	58
17	33	63	93
18	46	48	58
19	71	60	62
20	85	98	93
21	38	59	64
22	63	63	79

STUDENT SCORE	CAT SCORE	PRE-TEST SCORE	POST-TEST
23	71	63	100
24	66	94	94
25	66	44	99
26	87	76	67
27	53	66	85
28	88	54	84
29	63	51	43
30	48	80	98
31	42	21	68
32	66	97	100
33	73	62	63
34	39	68	89
35	62	54	58
36	48	77	67
37	95	58	97
38	97	73	94
39	58	84	72
40	34	72	65
41	42	56	51
42	70	55	84
43	70	58	60
44	70	96	100
45	73	93	100
46	55	46	85
47	37	21	51

STUDENT SCORE	CAT SCORE	PRE-TEST SCORE	POST-TEST
48	28	58	63
49	NOT AVAILABLE	48	57
50	76	94	97
51	93	100	100
52	51	87	71
53	52	71	47
54	50	57	100
55	45	80	77
56	32	46	51
57	77	43	80
58	63	58	75
59	80	71	64
60	47	53	62
61	65	90	97
62	41	55	53